

REMARKS

I. Status of the Claims

Claims 1-25 are pending in this application. Claims 1-25 have been rejected. Claims 1-6, 8, 11 and 12 have been amended to recite styrene as the specific vinyl aromatic hydrocarbon. Support for these amendments can be found at least at page 21 of the specification and original claim 12. No new matter has been introduced.

II. Applicants' Response to the Examiner's Rejections

A. The Claimed Block Co-Polymers Differ From Those Disclosed in Moczygemba Because Applicants' Synthetic Procedures are Different From Those in Moczygemba.

The examiner has rejected each of claims 1-25 under 35 U.S.C. § 102(b), or in the alternative 103(a), over Moczygemba (U.S. Patent No. 5,227,419). *Office Action* at 2. The examiner supports the rejection by reasoning that Moczygemba discloses producing block copolymers by methods comprising some reactants that are similar to those used to produce certain of Applicants' claimed block co-polymers. *Id.* at 2-3. However, although the claimed block copolymer is synthesized by the polymerization of butadiene with styrene in the presence of randomizer, like Moczygemba, the polymerization method that leads to the claimed block copolymer differs from that of Moczygemba. As a result of this difference, styrene block having a degree of polymerization ("DP") of 30 or more cannot be formed from the Moczygemba disclosure. Although the polymerization of butadiene with styrene in the presence of the randomizer forms a random copolymer in *some circumstances*, it does not *necessarily* form a random copolymer. Specifically, in Applicants' disclosed production methods, a small amount of the randomizer and a high ratio of styrene are used, and the temperature

during the polymerization is set at 75°C, thereby forming styrene block having DP of 30 or more in addition to some random copolymer.

Since Moczygamba does not perform the polymerization under the conditions as disclosed in the present application, it should be expected to form a large amount of random copolymer. Accordingly, it is not possible to form the specific styrene blocks disclosed in the present application. For example, step 4 of Moczygamba's Example II allows the temperature to fluctuate between 66-109°C, whereas Applicants' assert that allowing the reaction temperature to vary to this degree would prevent forming a styrene block having a DP of 30 or more. In the disclosed methods for forming polymers within the scope of the claims, Applicants maintain a more consistent temperature range, e.g., at 75°C. See, e.g., Specification at 52-56. Applicants also note that Moczygamba describes using significantly more randomizer than the exemplary embodiments disclosed by Applicants for providing a block copolymer within the claims. Additionally, Applicants note that Moczygamba describes using a larger ratio of butadiene:styrene in its step 4 than the ratio disclosed by Applicants in the exemplary embodiments. Applicants submit that the differences between Moczygamba's synthetic procedures and those exemplified in the specification would prevent Moczygamba's procedures from generating a block copolymer within the claims. In particular, Applicants submit that Moczygamba's procedures in step 4 would fail to provide a block copolymer having styrene blocks with a degree of polymerization of 30 or more.

As discussed in detail in the previous *Response*, and further in view of the above discussion, the Moczygamba procedure would not produce a polymer meeting the limitations of claim 1 because the potential products of the reaction would either have

(a) 6.5% of its “styrenes having an average polymerization degree of 30 or more” or (b) 100% of its “styrenes having an average polymerization degree of 30 or more” present within the molecular weight limitation of 35,000 or less. *See Response* of October 28, 2008 at 6-11. Neither of these possibilities fulfills the claim limitation that “40-80% by weight of the styrenes having an average polymerization degree of 30 or more have a molecular weight of 35,000 or less” *See, e.g., claim 1.*

In view of the above differences between the polymers disclosed in Moczygemba and those claimed in this application, Applicants respectfully request that the examiner withdraw the rejection of claims 1-25 under 35 U.S.C. § 102(b). Additionally, Applicants request that the examiner withdraw the rejection of these same claims under § 103(a) because the examiner has not provided any reasons for why a person having ordinary skill in the art would have been motivated to modify the above-discussed differences in order to arrive at a procedure that would generate Applicants’ claimed block copolymers.

B. The Toya Reference Neither Anticipates Nor Renders Prima Facie Obvious Applicants’ Claims 1-25.

The examiner has rejected claims 1-25 as anticipated by or, in the alternative, obvious over Toya. *See Final Office Action* at 3-4 (citing 35 U.S.C. 102(b) and 103(a)). In the *Response* of October 28, 2008, Applicants described, in detail, how the claims should be distinguished from Toya. *Response* of October 28, 2008 at 11-13. The examiner has not disagreed with Applicants’ distinctions over Toya. *Final Office Action* at 7-8. Rather, the examiner has pointed to a different example in the Toya patent and used it, instead, to support the rejection. *Id.* However, the examiner has only referred to an “Example ‘P12’ in Table 4” but has not provided reasons for why this example

should anticipate, or render obvious, Applicants' claims. *Id.* at 8. Also, the examiner has not stipulated the statutory basis of the rejection over this new example. *Id.* Lastly, Applicants are unclear as to where the examiner has identified the molecular weight value of 80,000, which, the examiner appears to contend, supports the rejection. *Id.*

Rejecting a claim under 35 U.S.C. § 102(b) requires identifying each and every element of the claim in a single prior art reference. MPEP 2131. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Rejecting a claim under 35 U.S.C. § 103(a) requires performing the *Graham* factual analysis, including ascertaining the differences between the claim at issue and the cited art. MPEP 2141. Although the examiner contends that Toya inherently discloses each element in the claims, he has not disputed the distinctions outlined by Applicants in the October 28, 2008 Response. Rather, the examiner has pointed to a newly cited example ("P12") but has not described how that example discloses each element of the claims. Likewise, the examiner has not indicated how example P12 differs from Applicants' claims or why these differences should be considered obvious. Analyzing these differences, within the context of the claim as a whole is required when rejecting a claim under 35 U.S.C. § 103. The examiner has only discussed a molecular weight value that he has apparently identified in the P12 example. However, the examiner has not informed Applicants where this data is disclosed in Toya, nor has he provided any reasons for how that data supports a rejection (and under which statute).

In view of the above remarks, Applicants respectfully request that the examiner withdraw the rejection of claims 1-25 under 35 U.S.C. 102(b), or in the alternative 103(a), over Toya.

C. Guntherberg Does Not Disclose a Polymer that Meets the “40-80%” Limitation of the Claims.

The examiner has rejected each of claims 1-12 and 14-25 under 35 U.S.C. 102(b), or in the alternative 103(a), over Guntherberg (U.S. 6,162,867). *Office Action* at 4-5. The examiner contends that “[s]ince applicants produce their materials in a similar manner in their specification examples, identical characteristics are assumed inherent.” *Id.* at 4. The examiner has specifically pointed to col. 13, lines 27 *et seq.* as disclosing such a presumptively similar material. *Id.* Applicants note that, in the example identified by the examiner, only the first and fifth steps produce homopolystyrene blocks. Steps 2-4 each produce “a block comprising randomly polymerized styrene....” *Id.* Overall, the styrene within the blocks consists of 32% of the overall styrene: $(1048 + 1048)/(1477 + 1477 + 1477)$. This value of 32% is outside of the recited 40-80% limitation in the claims. Accordingly, any presumption of inherency is refuted by this analysis of the data. The examiner has not suggested that a person of ordinary skill in the art would be motivated to modify Guntherberg's disclosure. Accordingly, Applicants respectfully request that the examiner withdraw the rejection of claims 1-25 under 35 U.S.C. 102(b), or 103(a), over Guntherberg.

D. Matsui Neither Discloses Nor Suggests 40-80% By Weight Styrene Blocks With a Molecular Weight of 35,000 or Less.

On page 8 of the Final Office Action, the examiner asserts that Matsui's (U.S. Patent App. No. 2004/0102576) Reference Example 8 contains a styrene/butadiene

ratio within the scope of the claims. Applicants respectfully disagree and provide reasons supporting their calculations below.

Applicants have analyzed the composition of the copolymer of Reference Example 8 and provide their calculations below. These calculations show how this Example is not within Applicants' claims.

In Reference Example 8, the block copolymer was obtained by adding monomers as summarized below.

1. Styrene: 56.5 kg (Mn: 178000 X (56.5 kg/225.1 kg)=45,000);
2. Butadiene: 16.9 kg;
3. Styrene: 78.3 kg and Butadiene 16.9 kg (BD/S=29/71(mol/mol));
4. Styrene: 56.5 kg (Mn: 178000 X (56.5 kg/225.1 kg)=45,000);

The above components result in a total monomer amount of 225.1 kg.

As shown above, the molar ratio of butadiene and styrene added in Step 3 is 29/71 (mol/mol). Applicants agree with the examiner that the molecular weight of the styrene block added in each of Steps 1 and 4 is 45,000. *See Office Action at 8.* Applicants note that 45,000 does not meet the limitation of 35,000 or less.

However, contrary to the examiner's contention, Applicants submit that the styrene in Matsui does not satisfy the limitation of claim 1 of "40 to 80% by weight of styrene (block) has a molecular weight of 35,000 or less." By calculating the ratio of Matsui's components in view of the calculations applied to embodiments of the claimed invention, this distinction is apparent. Below, Applicants provide an illustrative calculation pertaining to an embodiment of their invention and, immediately thereafter, apply that analysis to the Matsui disclosure cited by the examiner.

In the producing method of example A-1 of the present invention, the amount of styrene added in Steps 2 to 6 is 13.2 (parts by weight) X 5 (times) = 66 parts by weight. Additionally, the ratio of "styrene having a molecular weight of 35,000 or less" is 80 (styrene content) X 0.52 (block rate) X 0.63 (the ratio of the block styrene having the molecular weight of 35,000 or less) = 26.2 parts by weight. This means that, in 66 parts by weight of styrene, added in Steps 2 to 6 of A-1, 26.2 parts by weight of styrene is "styrene having a molecular weight of 35,000 or less." Accordingly, the ratio thereof is $26.2 \text{ (parts by weight)} / 66 \text{ (parts by weight)} \times 100 = \underline{\underline{39.7\%}}$ by weight (see Table 1 of the present specification).

In the same manner, in the case of Step 3 of Reference Example 8 in Matsui, the ratio of "styrene having a molecular weight of 35,000 or less" is calculated by applying the above-described calculation as follows:

$$78.3 \text{ kg} \times 0.397 = 31.1 \text{ kg}$$

$$31.1 \text{ kg} / (56.5 \text{ kg (Step 1)} + 31.1 \text{ kg (Step 3)} + 56.5 \text{ kg (Step 4)}) \times 100 = \underline{\underline{21.6\%}} \text{ by weight.}$$

Accordingly, Masui's Example 8, relied on by the examiner to support the rejection does not meet the limitations of the claims. Applicants respectfully request that the examiner withdraw the rejection of claims 1-25 under 35 U.S.C. 102(b), or 103(a), over Masui.

III. Conclusions

Applicants respectfully request that the examiner withdraw the rejections of claims 1-25 under 35 U.S.C. 102(b), or in the alternative 103(a). For each of the disclosures cited by the examiner to support these rejections, the synthetic procedure disclosed would not produce a block copolymer within the limits recited in Applicants'

claims. Additionally, the examiner has not provided any objective evidence that shows reasons for why one would modify any of the cited references to arrive at Applicants' claims. Accordingly, Applicants respectfully request that the examiner withdraw the rejections of claims 1-25 under 35 U.S.C. 102(b), or in the alternative 103(a).

If there are any fees due in connection with the filing of this response, please charge the fees to Deposit Account No. 06-0916. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our deposit account.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

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By: Charles E. Van Horn
Charles E. Van Horn
Reg. No. 40,266